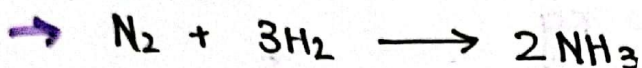


CHAPTER ONE

STOICHIOMETRY

SELF-CHECK EX 1.1

(a) → GIVEN



- Moles of Nitrogen = ?
- Moles of NH_3 = 5.0 moles

• SOLUTION

According to chemical equation,

$$1 \text{ mole of N} = 2 \text{ moles of NH}_3$$

$$\frac{1}{2} \text{ moles of N} = 1 \text{ mole of NH}_3$$

$$\frac{1}{2} \times 5.0 = 5 \text{ moles of NH}_3$$

$$2.5 \text{ moles} = 5 \text{ moles of NH}_3$$

→ Answer = 2.5 moles of N for 5 moles of NH_3

(b) → GIVEN

→ Hydrogen moles = ?

→ NH_3 moles = 5.0

→ SOLUTION

$$3 \text{ moles of H} = 2 \text{ moles of NH}_3$$

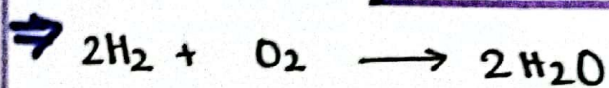
$$\frac{3}{2} \text{ moles of H} = 5 \text{ moles of NH}_3$$

$$\frac{3}{2} \times 5 \text{ moles of H} = 5 \text{ moles of NH}_3$$

7.5 moles of Hydrogen

Answer: 7.5 moles of Hydrogen

SELF-CHECK Ex 1.2



→ GIVEN

Mass of oxygen = ?

Mass of Hydrogen = 1.02×10^5 kg

$$\text{Moles of H}_2 - \text{Moles} = \frac{\text{Mass}}{\text{Molar mass}} = \frac{1.02 \times 10^5}{2} = 51000$$

→ SOLUTION

By comparison,

2 moles of Hydrogen = 1 mole of oxygen

moles of Hydrogen = $\frac{1}{2}$ moles of oxygen

$$\begin{aligned} 51000 \text{ moles of Hydrogen} &= \frac{1}{2} \times 51000 \text{ moles of Oxygen} \\ &= 25500 \text{ moles of oxygen} \end{aligned}$$

$$\begin{aligned} \text{Mass of O}_2 &= \text{No of moles of O}_2 \times \text{Molar mass} \\ &= 25500 \times 32 \end{aligned}$$

$$= 816000$$

$$= 8.16 \times 10^5 \text{ kg oxygen}$$

→ Answer = 8.16×10^5 kg oxygen

SELF-ASSESSMENT 1.3

(a) • GIVEN

Moles of oxygen = ?

Volume of oxygen = 50.0 dm^3

• FORMULAS

Molar volume = 22.4 dm^3

• SOLUTION

1 mole of O_2 = 22.4 dm^3 volume

$\frac{1}{22.4}$ mole of O_2 = 1 dm^3 volume

$\frac{1}{22.4} \times 50$ moles of O_2 = 50 volume

2.23 moles of O_2 = 50 dm^3 volume

• Answer:- 2.23 moles of oxygen

(b) • GIVEN

Volume = ?

N_2 moles = 0.80 moles

1 mole of N_2 = 22.4 dm^3 volume

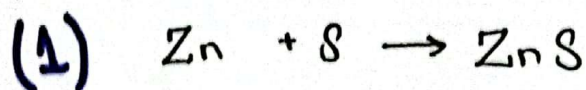
$0.80 = 22.4 \times 0.80 \text{ dm}^3$

= 17.92 dm^3

• Answer = 17.92 dm^3 of volume is occupied / covered by 0.80 mole of N_2 .

SELF-ASSESSMENT

1.4



(a) GIVEN

Zinc = 6.00g, moles of zinc = $\frac{6}{65.3} = 0.091$

Sulphur = 4.00g, moles of S = $\frac{4}{32} = 0.125$

Limiting reactant = ?

By comparison,

1 mole of Zn = 1 mole of ZnS

0.091 moles of Zn = 0.091

1 mole of S = 1 mole of ZnS

0.125 moles of S = 0.125 moles of S

As Zinc produces least no of products,
it is the limiting reactant

Ans:- Zinc

(b) Mass of Zinc Sulphide = ?

GIVEN

Moles of ZnS = 0.091 moles

Molar mass of ZnS = 97.38

FORMULA

Mass = Moles \times Molar mass

SOLUTION

ZnS Mass = 0.091 \times 97.38

= 8.861 g

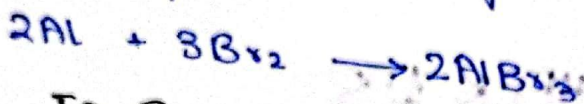
Ans:- 8.861g of ZnS

SELF - CHECK : 1.4

(2) GIVEN

$$\text{Mass of Al} = 15.8 \text{ g}$$

$$\text{Mass of Br}_2 = 55.6 \text{ g}$$



TO FIND

Limiting Reactant = ?

SOLUTION

$$\text{Moles of Al} = \frac{15.8}{27} = 0.585$$

$$\text{Moles of Br}_2 = \frac{55.6}{80 \times 2} = 0.3475$$

LIMITING REACTANT

By Comparison,

$$2 \text{ moles of Al} = 2 \text{ moles of AlBr}_3$$

$$1 \text{ mole of Al} = \frac{2}{2} \text{ moles of AlBr}_3$$

$$0.585 \text{ moles " } = 0.585 \text{ moles}$$

$$3 \text{ moles of Br}_2 = 2 \text{ moles of AlBr}_3$$

$$1 \text{ mole of Br}_2 = \frac{2}{3} \text{ moles of AlBr}_3$$

$$= \frac{2}{3} \times 0.3475 \text{ moles of AlBr}_3$$

$$= 0.2317 \text{ moles of Br}_2$$

Answer = Br₂ is the limiting reactant

(b) Mass of AlBr_3

Sol: Mass = Moles \times Molar mass ::
= 0.2317×267
= 61.86 Ans

SELF - CHECK 1.5

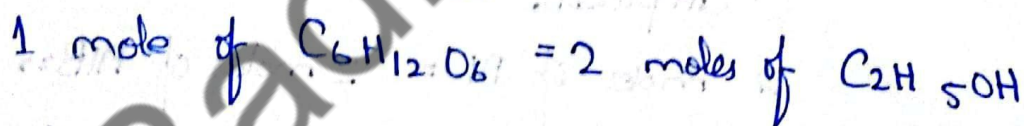
Q1) • GIVEN

(a) Glucose mass = 10g

• TO FIND
theoretical yield = ?

• SOLUTION:

Moles of glucose = $\frac{10}{180} = 0.055$ moles



0.55 moles $\Rightarrow = 0.55 \times 2$ "

= 0.11 moles of $\text{C}_2\text{H}_5\text{OH}$

Mass of $\text{C}_2\text{H}_5\text{OH} = 0.11 \times 46$
= 5.11 g of $\text{C}_2\text{H}_5\text{OH}$

Theoretical yield = 5.11 g of $\text{C}_2\text{H}_5\text{OH}$

(b) Percentage yield = ?

= $\frac{\text{Actual yield}}{\text{theo yield}} \times 100$
= $\frac{0.664}{5.11} \times 100$

$$= 12.99\%$$

$$\text{Percentage yield} = 12.99\% \quad \underline{\underline{\text{Ans}}}$$

Qno:2) • GIVEN

Mass of $\text{CO}_2 = ?$

Mass of Methane = 1250 g

• SOLUTION

$$\text{Moles of Methane} = \frac{1250}{16} = 78.125$$

1 mole of $\text{CH}_4 = 1$ mole of CO_2

78.1 " = 78.1 "

$$\text{Mass of } \text{CO}_2 = 78.1 \times 44$$

$$\underline{\underline{= 3436.4 \text{ Ans}}}$$

(b) Actual yield = 3000 g

theoretical yield = 3436.4

Percentage yield = ?

$$P.Y = \frac{3000}{3436.4} \times 100$$

$$= 87.37\% \quad \underline{\underline{\text{Ans}}}$$